

DOCKET NO: 240441US0

IN THE UNITED STATES PATENT & TRADEMARK OFFICE

IN RE APPLICATION OF :
HAJIME IKUNO, ET AL. : EXAMINER: MORILLO, J.
SERIAL NO: 10/620,388 : GROUP ART UNIT: 1742
FILED: JULY 17, 2003 : RCE FILED APRIL 18, 2007
FOR: PISTON MADE OF ALUMINUM :
CAST ALLOY AND METHOD OF
MANUFACTURING THE SAME

THIRD DECLARATION UNDER 37 C.F.R. § 1.132

COMMISSIONER FOR PATENTS
ALEXANDRIA, VIRGINIA 22313

SIR:

I, Hajime Ikuno, a citizen of Japan, hereby declare and state that:

1. I have a Master's degree in metallic material engineering, which was conferred upon me by Osaka University located in 2-1 Yamadaoka, Suita, Osaka, Japan.

2. I have been employed by Toyota Central Research & Development Laboratories, Inc., since 1985 and I have a total of 22 years of work and research experience in the field of metallic materials.

3. The following experiments were carried out by me or under my direct supervision and control.

4. The experimental conditions used to create Tables 9, 10 and 11 of the specification were used to produce the attached Table and twenty-one figures.

5. The Table presents compositional data for the Al alloys appearing in the twenty-one figures. The first twenty figures show the microstructure of twenty alloys each containing an amount of Ca within the "Ca (Calcium) : 0.0005-0.003 mass %" of independent Claims 1, 15, 26 and 31. The twenty-first figure shows the microstructure of a comparative twenty-first Al alloy (i.e., comparative example sample No. A3, see specification at page 46, Table 9 and Fig. 7) with only 0.0002 mass % Ca and having a coarse, non-homogeneous microstructure.

6. The Table and figures show that the significant improvement in homogeneous microstructure (texture) that is achieved in accordance with the present invention over the range of "Ca(Calcium) : 0.0005-0.003 mass%" is achieved over the ranges of Ti, Si, Cu, Fe, Ni, P, V, Zr and Mn respectively featured in independent Claims 1, 15, 26 and 31.

7. I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that those statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of this application or any patent issuing thereon.

8. Further declarant saith not.

Date: June 25, 2008

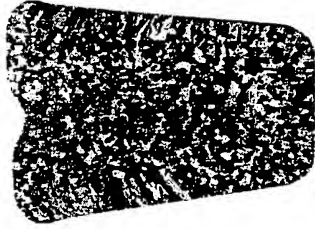
Hajime Ikuno

Hajime Ikuno

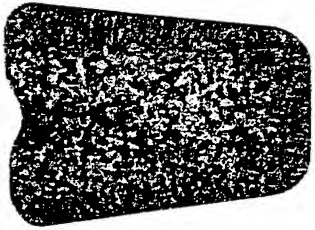
Attached:

Table

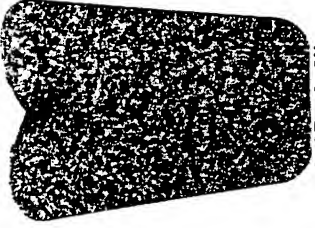
Twenty-one figures



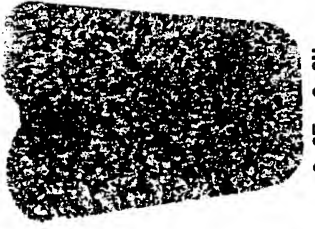
0.3Mg



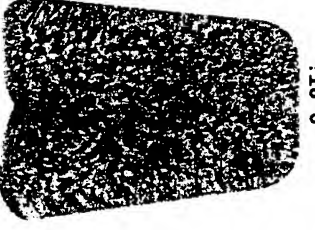
0.8Mg



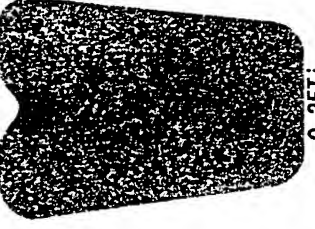
0.2Fe-0.2Mn



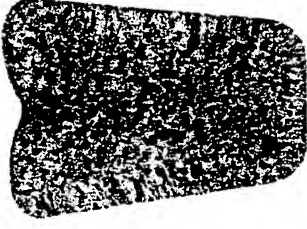
0.6Fe-0.6Mn



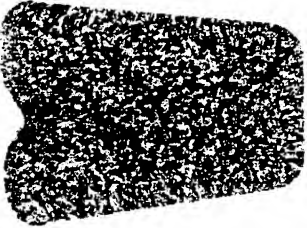
0.2Ti



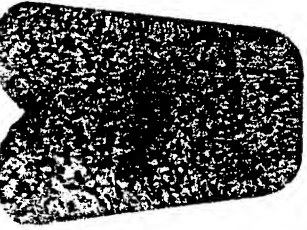
0.35Ti



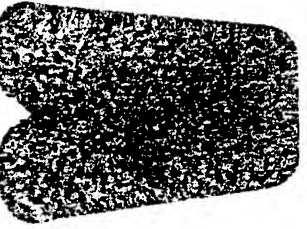
0.05Zr-0.05V



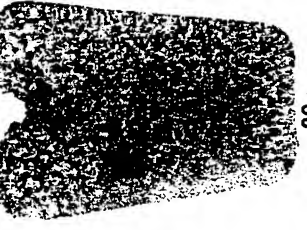
0.1Zr-0.1V



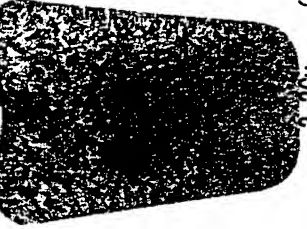
1.8Ni



2.5Ni

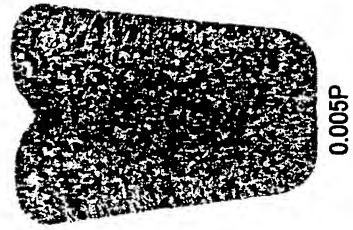


2Cu

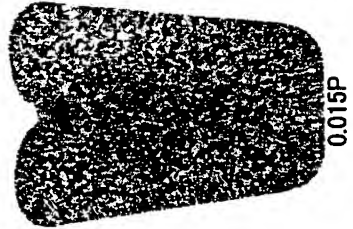


3.2Cu

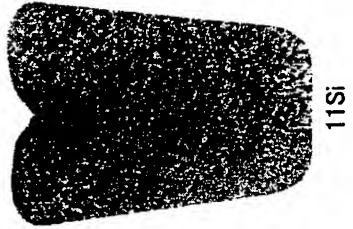
(mass%)



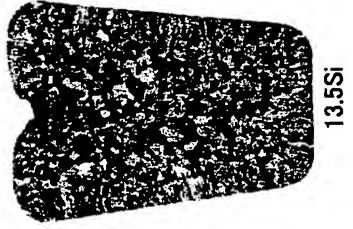
0.005P



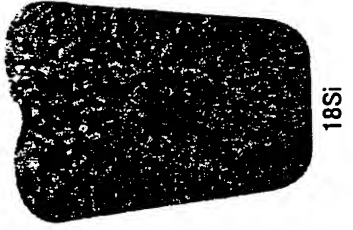
0.015P



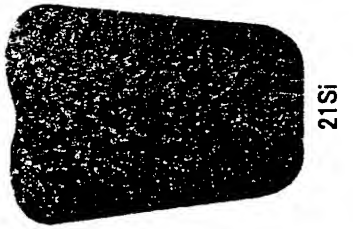
11Si



13.5Si

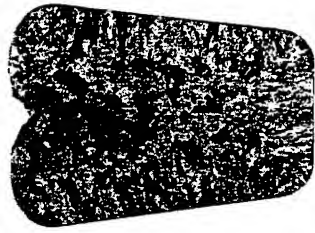


18Si



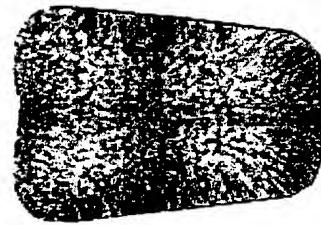
21Si

(mass%)

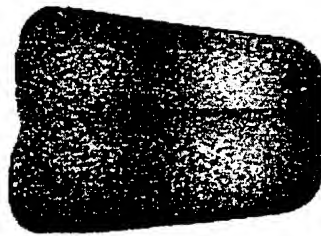


Comparative sample A3

10mm



20Si+Mg



11Si-0Mg

10mm

Table												
sample Code	chemical composition (mass%)											
	Si	Cu	Mg	Ni	Fe	Mn	Ti	Zr	V	P	Ca	
0.3Mg	12.0	3.0	0.3	2.4	0.5	0.5	0.23	0.12	0.08	0.01	0.0014	
0.8Mg	11.7	2.9	0.8	2.3	0.5	0.5	0.22	0.12	0.08	0.01	0.0017	
0.2FeMn	11.7	3.0	0.6	2.4	0.2	0.2	0.23	0.12	0.08	0.01	0.0012	
0.6FeMn	11.3	2.8	0.6	2.2	0.6	0.6	0.21	0.11	0.07	0.01	0.0013	
0.2Ti	11.8	2.9	0.7	2.3	0.5	0.5	0.20	0.11	0.10	0.01	0.0014	
0.35Ti	11.4	2.9	0.6	2.3	0.4	0.5	0.35	0.11	0.06	0.01	0.0016	
0.05ZrV	11.6	2.9	0.6	2.3	0.5	0.5	0.22	0.05	0.05	0.01	0.0015	
0.1ZrV	11.5	2.9	0.6	2.3	0.5	0.5	0.23	0.10	0.10	0.01	0.0012	
1.8Ni	11.9	2.9	0.6	1.8	0.5	0.5	0.22	0.12	0.09	0.01	0.0012	
2.5Ni	11.6	2.8	0.6	2.5	0.5	0.5	0.22	0.11	0.09	0.01	0.0019	
2Cu	11.7	2.0	0.7	2.4	0.5	0.5	0.23	0.13	0.09	0.01	0.0013	
3.2Cu	11.4	3.2	0.6	2.3	0.5	0.5	0.22	0.12	0.09	0.01	0.0015	
0.005P	11.5	3.0	0.7	2.4	0.5	0.5	0.22	0.12	0.10	0.005	0.0015	
0.015P	11.4	3.1	0.6	2.3	0.5	0.5	0.23	0.12	0.16	0.015	0.0013	
11Si	11.0	2.9	0.7	2.3	0.5	0.5	0.23	0.12	0.10	0.01	0.0015	
11Si-0Mg	10.9	3.2	<0.01	2.3	0.4	0.4	0.23	0.10	0.10	0.01	0.0012	
13.5Si	13.5	2.9	0.6	2.3	0.5	0.5	0.22	0.12	0.08	0.01	0.0021	
18Si	18.0	3.2	<0.01	2.3	0.4	0.4	0.25	0.10	0.10	0.01	0.0010	
21Si	21.0	3.0	<0.01	2.4	0.4	0.4	0.21	0.10	0.06	0.01	0.0030	
20Si+Mg	20.3	2.9	0.6	2.0	0.4	0.5	0.23	0.09	0.10	0.01	0.0020	
A3	13.8	3.0	<0.01	2.3	0.4	0.4	0.20	0.10	0.06	0.01	0.0002	